Fast temporal video segmentation based on Krawtchouk-Tchebichef moments

ABSTRACT

With the increasing growth of multimedia data, the current real-world video sharing websites are being huge in repository size, more specifically video databases. This growth necessitates to look for superior techniques in processing video because video contains a lot of useful information. Temporal video segmentation (TVS) is considered essential stage in content-based video indexing and retrieval system. TVS aims to detect boundaries between successive video shots. TVS algorithm design is still challenging because most of the recent methods are unable to achieve fast and robust detection. In this regard, this paper proposes a TVS algorithm with high precision and recall values, and low computation cost for detecting different types of video transitions. The proposed algorithm is based on orthogonal moments which are considered as features to detect transitions. To increase the speed of the TVS algorithm as well as the accuracy, fast block processing and embedded orthogonal polynomial algorithms are utilized to extract features. This utilization will lead to extract multiple local features with low computational cost. Support vector machine (SVM) classifier is used to detect transitions. Specifically, the hard transitions are detected by the trained SVM model. The proposed algorithm has been evaluated on four datasets. In addition, the performance of the proposed algorithm is compared to several state-of-the-art TVS algorithms. Experimental results demonstrated that the proposed algorithm performance improvements in terms of recall, precision, and F1-score are within the ranges (1.31 - 2.58), (1.53 - 4.28), and (1.41 - 3.03), respectively. Moreover, the proposed method shows low computation cost which is 2% of real-time.

Keyword: Temporal video segmentation; Shot boundary detection; Orthogonal polynomials; Orthogonal moments